of the optical disc. As shown in FIG. 2, the center portion of the recording area has the relatively consistent thickness, but the portions adjacent to the inner circumferential portion or adjacent to the outer circumferential portion of the disc have the varied thickness.

Furthermore during the injection molding for fabricating a substrate of the optical disc which is formed of a plastic, the inner diameter portion and outer diameter portion of the disc present optical inconsistency owing to the differences in resin temperature, cooling time, etc. The deviations of the recording characteristics incited due to the inconsistent substrate and varied thickness of the recording layer currently satisfy the stipulated standard of using the disc, which, however, are required to be improved in the aspect of reliability.

Therefore, a lot of endeavors has been made until now for securing the consistency. Nevertheless, the thickness variation of the recording layer shows a deviation of $\pm$ 2% currently. Additionally, it is a general point of view that the inconsistency is difficult to be completely solved.

As described above, the optical disc allots the spare areas of the prescribed rate (approximately 5.7%) with respect to overall zone capacity in setting the recording area. As described with reference to FIG. 2, the optical disc is inconsistent thickness throughout it to involve the inconsistency resulting from the varied thickness in the lengthwise direction of the radius. Consequently, since the defect occurring rates at specific points of the optical disc are respectively differed from one another, a specific zone cannot be used further if the defect within the corresponding zone is increased to employ all replaceable spare areas. For this reason, overall disc may not be used to incur a problem of lacking in reliability of the disc due to the increase of the defective portions.

SUMMARY OF THE INVENTION

Therefore, it is an object of the present invention to provide a method for variably setting the rate of spare areas in an optical disc, wherein, in order to solve the above-enumerated problems, the rates of spare area arranged within the optical disc are variably set.

It is another object of the present invention to provide an optical disc having variable spare area.

To achieve the above and other objects of the present invention, there is

provided an optical disc comprising a main area for storing digital data, the main area being divided with a plurality of zones; and a spare area, having a variable area rate within the each zone of main area, for storing the corresponding digital data instead of the main area to prepare an occurring data error due to a defect of the main area.

Also, a method for setting spare areas of an optical disc for preparing a liably-occurring recording error due to a defect of said optical disc, wherein the method for setting said spare areas of the optical disc is preformed by variably setting the spare area rates of which size rates are variably set in the radius direction of the optical disc.

In the optical disc formed according to the present invention in view of the above construction, the spare area rates provided for respective zones are not constantly allotted per zone, but are variably provided per zone to enable to deal with a liably-occurring defect in accordance with the thickness variation of the disc, thereby improving overall reliability of the disc.

BREIF DESCRIPTION OF THE DRAWINGS

The above objects and other advantages of the present invention will become more apparent by describing in detail preferred embodiments thereof with reference to the attached drawings in which:

FIG. 1 is a view showing a format of a general optical disc; and

FIG. 2 is a view showing the thickness variation in the radius direction of the optical disc.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

When arranging the rates of spare areas in the present invention, the total quantity of the spare areas during fabricating an optical disc according to the present invention is set to be identical to that of the optical disc that has the typical spare areas. Also, in arranging the spare areas, it is constructed that the sizes of the spare areas arranged onto the inner circumferential portion or outer circumferential portion are relatively larger than those of the spare areas arranged onto the center portion by considering the above-mentioned thickness characteristics of the recording layer of the optical disc as shown in FIG. 2. In the present invention the term "spare area rate" means the rate of a spare area to a zone area.

However, the present invention is not limited to the above-described embodiment, but can be applied to the optical disc that does not the typical spare areas.

A fabricating method of the optical disc is largely performed by steps of forming a stamper, of injection-molding a transparent substrate having a thickness of about 0.6mm by using the prepared stamper of covering a recording layer over the molded transparent substrate by using a continuous-type sputter, and of adhering the disc formed with the recording layers. The detailed steps are of the well-known in the art, of which detailed descriptions will thus be deleted.

For the purpose of examining the reliabilities of the optical disc having the variable rates of spare areas according to the present invention and the optical disc having the conventional fixed spare areas as presented in <Table 1>, a comparative example having the rate based on <Table 1> is compared with the first and second embodiments of the present invention having the rates resulting from <Table 2> and <Table 3> to be described later, thereby being tested.

The fabrication of the optical disc according to the first embodiment of the present invention is identical to that of the optical disc of the conventional technique which is to be the comparative object until forming the recording layer.

In other words, a widely-used mastering facility of Sony Co. is employed for fabricating the stamper, and the transparent substrate having the thickness of about 0.6mm is injection-molded by using the fabricated stamper. At this time, a molder of Meiki Mfg. (Japan) is employed while using polycarbonate (product of GE). The molded transparent substrate is covered with the recording layer by using the continuous-type sputter of Jinko Co. of Japan.

Then, the spare areas occupying a predetermined rate of the capacity (number of blocks is 76424) of the total zone (23) of the optical disc fabricated as above are formed. The optical disc having the spare areas stated in <Table 1> is prepared as the comparative example. That is, it is installed in a manner that the rate of the spare areas is to be 5.37% (number of blocks is 4104), and the rate of the spare area with respect to each zone capacity is to be 5.37%.

Also, in the first embodiment of the present invention, the total zone capacity and rate of the spare area of the optical disc fabricated are identically installed. Except that, it is arranged such that the spare rates with respect to the sizes of the recording area within the respective zones has the rate as shown in <Table 2>.

<Table 2>

Zone	Size of Recording Area (No. of blocks)	Size of Spare Area (No. of blocks)	Rates (%)
0	1901	204	10.73%
1	2010	216	10.75%
2	2122	171	8.06%
3	2234	180	8.06%
4	2346	126	5.37%
5	2458	132	5.37%
6	2570	69	2.68%
7	2682	72	2.68%
8	2792	75	2.69%
9	2904	78	2.69%
10	3016	81	2.69%
11	3128	84	2.69%
12	3240	87	2.69%
13	3352	90	2.68%
14	3464	93	2.68%
15	3576	96	2.68%
16	3686	99	2.69%
17	3798	102	2.69%
18	3910	210	5.37%
19	4022	216	5.37%
20	4134	333	8.06%
21	4246	342	8.05%
22	4358	468	10.74%
23	4475	480	10.73%
Total	76424	4104	5.37%

That is, it is changed such that zone 0 is to 10.73%, zone 1 is to 10.75%, zones 2 and 3 are to 8.06%, zones 4 and 5 are to 5.37%, zones 6 and 7 are to 2.68%, zones 8 to 12 are to 2.69%, zones 13 to 15 are to 2.68%, zones 16 and 17 are to 2.69%, zones 18